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HUNGRY HORSE POWERPLANT ENLARGEMENT & REREGULATING RESERVOIR FEASIBILITY STUDY

HUNGRY HORSE PROJECT
MONTANA

APRIL 1982

BUREAU OF RECLAMATION
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I N T R O D U C T I O N

The Bureau of Reclamation has a detailed feasibility study underway which could lead to expansion of hydroelectric power generation facilities at Hungry Horse Dam and construction of a flow regulation structure downstream. This brochure discusses the status of the feasibility study and reviews the potential project features that are being evaluated. The study is being coordinated with several State and Federal agencies having authorities and responsibilities in the area.

Your opinions and comments on the potential project features will be important in helping us to select a plan to recommend for construction. Please review the information and provide your comments using the addressed comment sheet at the back of this brochure. Postage is not required.

S T U D Y O B J E C T I V E S

The feasibility study, which has been authorized by Congress, has the objectives of increasing hydroelectric power generation at existing Hungry Horse Powerplant and meeting fish and wildlife conservation and public recreation needs. A basic constraint to the planning effort is that any plan of development should not adversely impact fishery resources of the Flathead River system.

B A S I C R E S O U R C E S

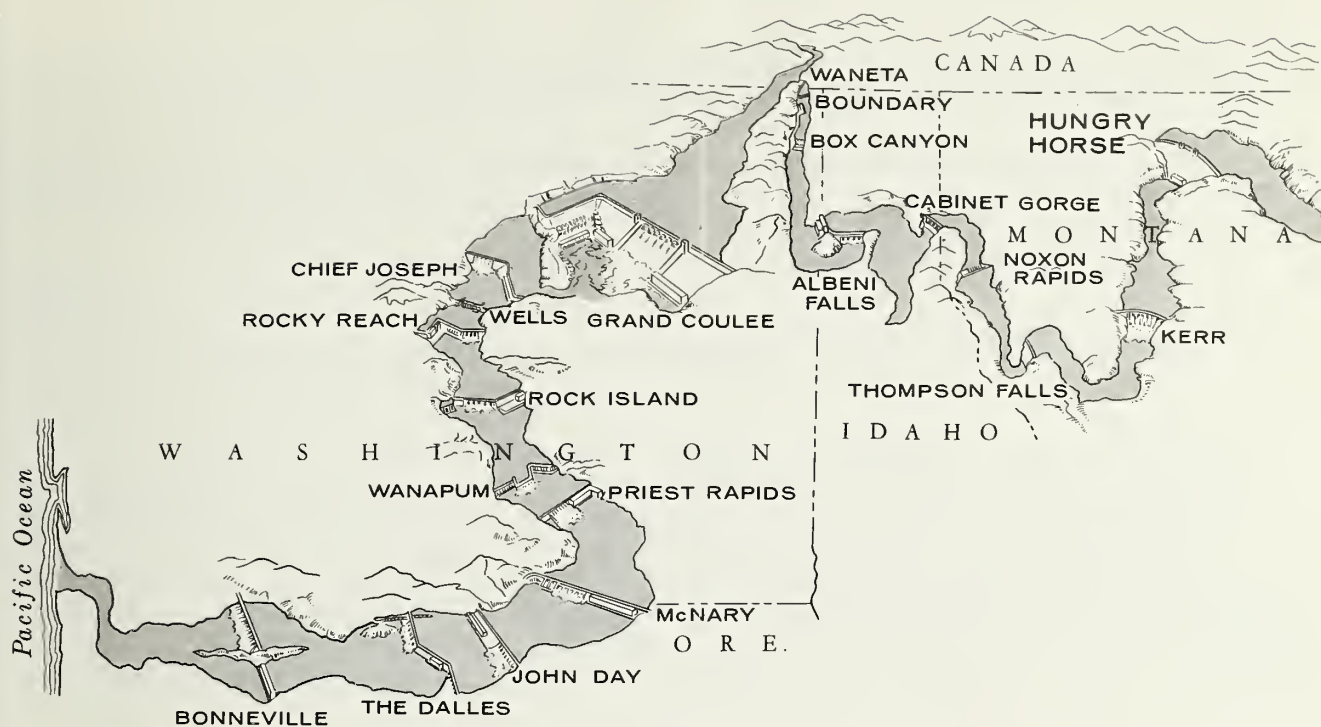
Hungry Horse Reservoir, with an active capacity of nearly 3 million acre-feet, is the third largest reservoir in the Federal Columbia River Power System. Being the most distant upstream reservoir, Hungry Horse helps control floodflows in the Flathead Valley and in the Columbia River. Floodwaters stored in the spring are released when needed to provide onsite power generation and to increase generation at 19 downstream hydroelectric powerplants (see figure 1). In an average year more than 800 million kilowatt-hours of electrical power are generated at Hungry Horse Powerplant, and an additional 4.6 billion kilowatt-hours are generated at downstream plants from water stored at the project. The powerplant contains four generators, having a total nameplate rating of 285,000 kilowatts. However, the generators can be safely operated up to a capacity of 328,000 kilowatts when needed.

The Forest Service has developed several overnight camping, picnicking, and boat launching facilities around the 35-mile-long Hungry Horse Reservoir.

T H E P L A N N I N G P R O C E S S

The Bureau of Reclamation completed a preliminary study on the Hungry Horse Powerplant enlargement and reregulating dam in 1980. The preliminary study discussed water-related needs and plans to meet those needs. The study concluded that:

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<u>Project</u>	<u>Installed Generating Capacity</u> <i>kilowatts</i>
Hungry Horse	285,000
Kerr	168,000
Thompson Falls	30,000
Noxon Rapids	396,880
Cabinet Gorge	200,000
Albeni Falls	42,600
Box Canyon	60,000
Boundary	634,600
Waneta (Canada)	292,500
Grand Coulee	6,463,000
Chief Joseph	2,069,000
Wells	774,300
Rocky Reach	1,213,150
Rock Island	622,500
Wanapum	831,250
Priest Rapids	788,500
McNary	980,000
John Day	2,160,000
The Dalles	1,807,000
Bonneville	518,400

Figure 1.--Controlled release of storage at Hungry Horse Dam in northwest Montana increases power production of entire Columbia River system.

1. Additional hydroelectric power generation can be achieved economically and within the environmental quality objectives established for the area.

2. There is a potential to significantly improve the kokanee fishery of the upper Flathead River-Lake system.

3. Expansion of recreation facilities at Hungry Horse Reservoir may be desirable.

The preliminary study report was distributed to the public, and study results were presented through local media.

The detailed feasibility study will confirm preliminary study conclusions through more detailed analysis. The preliminary plans will be reviewed, and modifications or additions will be made as required. Detailed evaluations of plans will be made to determine if benefits will exceed costs, revenues will be sufficient to repay construction and other investment costs within an acceptable time period, and environmental and social effects will be acceptable. A plan will be recommended for construction based on the results of the detailed evaluations and public response.

P O T E N T I A L P L A N E L E M E N T S


The plan elements described here are potential actions or measures that were developed or identified in the preliminary study. They are now being reevaluated for possible inclusion in a detailed plan. However, the list of plan elements is not necessarily final, and additions and deletions may be made in response to public expression and information obtained during the study.

INCREASE ELECTRICAL ENERGY PRODUCTION

The primary objective of the feasibility study is to define a plan to increase generation of electrical energy to meet powerloads in the Pacific Northwest. Possible means for increasing generation at Hungry Horse which are now being considered are summarized below.

Uprate Existing Generators

One action that would increase generation would be to uprate the existing four generators to provide a greater generating capacity. An uprate would consist of rewinding generators using newer materials to increase the maximum electrical generating capability and replacing associated electrical equipment to handle the higher capacity. Uprating is possible since the hydraulic capacity of the existing turbines and penstocks under normal reservoir water surface levels exceeds the electrical limits of the generators. Studies to increase the installed capacity from the existing 285,000 kilowatts to 385,000 kilowatts or more are being made. River and reservoir operation changes with an uprating would be relatively minor.



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New Powerplant at Outlet

The possibility exists to construct a new powerplant at the site of the existing outlet valve house (see photos). In addition to increasing the total power capacity at the site, the additional generators would allow greater flexibility in shutdown of existing generators for maintenance purposes and would be available for generation during an unscheduled outage of existing units. A powerplant with three units having a total installed capacity of 55,000 kilowatts is being evaluated. Reservoir operations with the new powerplant would remain essentially unchanged, but downstream river operations could change significantly.

Uprate and New Powerplant at Outlet

A combination of the uprate and a new powerplant at the outlet is possible. Downstream river operation could change significantly with this option.

Reregulating Dam and Reservoir

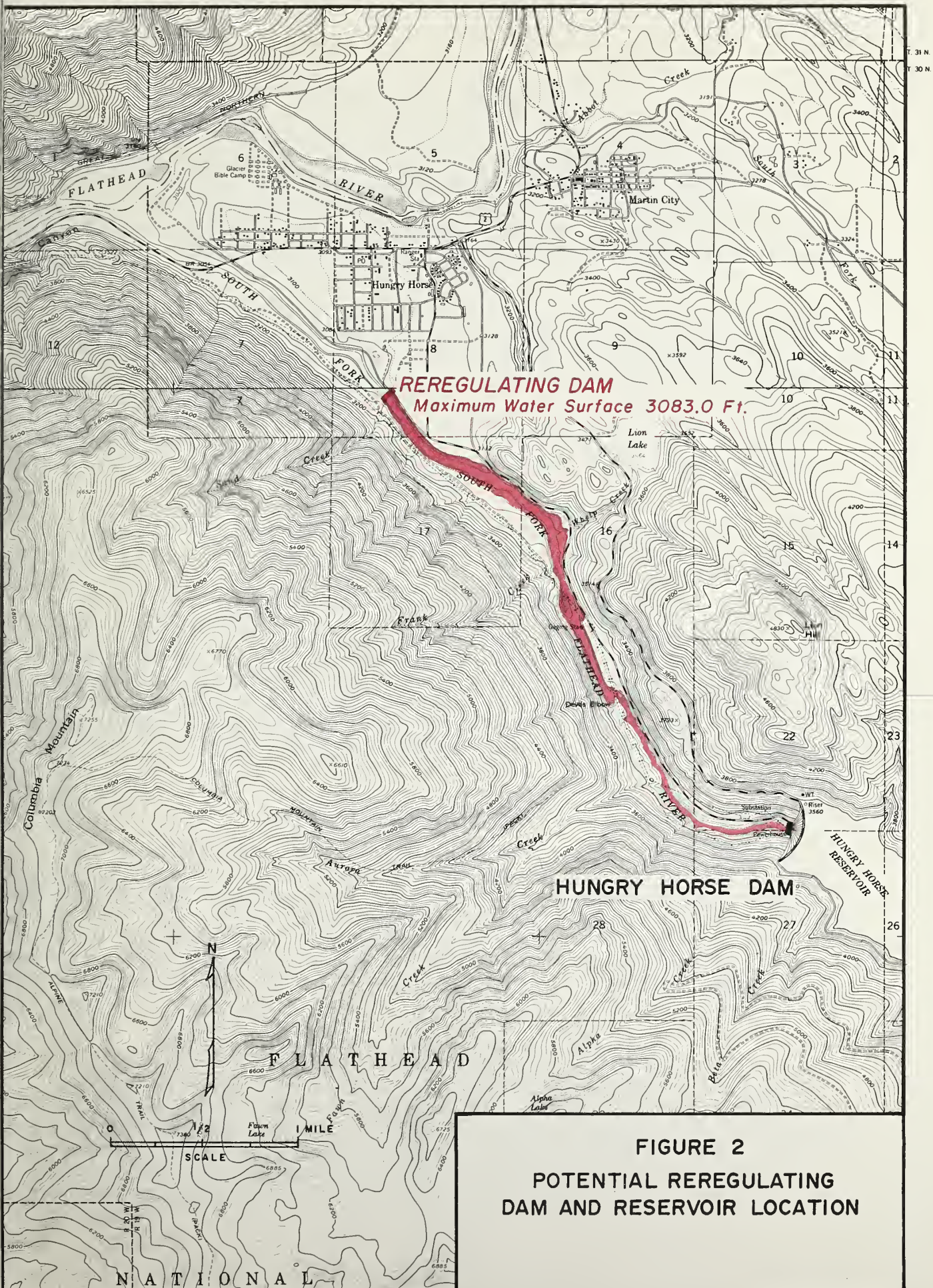
A reregulating dam and reservoir on the South Fork Flathead River is one potential means of protecting the fishery resources of the Flathead River system while increasing power capacity at Hungry Horse. A reregulating dam is being considered a part of each of the above power potentials. The reregulating facility could modulate flow fluctuations during power peaking operations and improve flows for kokanee spawning and egg survival.

Water would be stored at the reregulating facility during periods of peak power generation, and this would reduce downstream fluctuations by diminishing peak flows. After power generation is reduced or discontinued, water held in the reregulating reservoir would be released to provide a desired level of minimum flow downstream.

The reregulating dam would be on the South Fork Flathead River about 3.4 miles downstream from Hungry Horse Dam (see figure 2). In the 1980 preliminary study the height of the reregulating dam was estimated to be about 51 feet above the streambed. The 2,000-acre-foot reregulating reservoir would extend upstream to Hungry Horse Dam and have a surface area of about 88 acres. The reregulated portion of the South Fork (3.4 miles) would be freeflowing during those periods when the reregulating dam was not being used to modulate powerplant releases.

Low Head Powerplant at Reregulating Dam

Installation of a small generating facility at the potential reregulating dam may be possible. Powerplants of 4,000, 6,000, and 8,000 kilowatts were briefly evaluated in the 1980 study, but costs appeared to be greater than benefits at that time. A reanalysis of this potential will be made in the feasibility study.



New Left Bank Powerplant

The possibility of boring a hole through Hungry Horse Dam, installing penstocks, and constructing a new 100,000- to 200,000-kilowatt powerplant on the left bank of the South Fork Flathead River was briefly considered in the 1980 study. Although preliminary economic analysis indicated that this potential would be economically justified, additional engineering and geological information is needed before a complete assessment of the engineering feasibility can be made.

The combined discharge of the existing powerplant and a left bank powerplant would increase flows in the South Fork Flathead River by 3,500 to 7,000 cubic feet per second. Flows of this magnitude would likely exceed the physical capability of a downstream reregulating reservoir to effectively modulate flows, and this would appear to violate the objective of not adversely affecting fishery resources of the Flathead River system. Additional engineering and environmental information is being gathered so that a final decision can be made on whether to continue or drop this element from further consideration.

MAINTAIN AND ENHANCE THE EXISTING KOKANEE FISHERY

Reregulating Dam and Reservoir

The potential reregulating dam and reservoir discussed above, in addition to protecting the existing kokanee fishery from adverse flow conditions associated with power peaking operations, has the potential to enhance fishery habitat conditions over those now existing. Even with additional power facilities at Hungry Horse Dam, reregulation could reduce flow fluctuations in the main stem Flathead River and improve spawning and egg survival conditions.

South Fork Spawning Channel

The feasibility study will consider development of a kokanee spawning channel in the South Fork Flathead River downstream from the potential reregulating dam. Although spawning sites are very limited in the 3.4 miles of the South Fork between Hungry Horse Dam and the reregulating site, operation of the reregulating reservoir would make this river reach unsuitable for spawning. The study will evaluate the desirability and justification for a spawning channel to supplement main stem spawning in low water years.

Modification of Hungry Horse Operating Criteria

A changed operating criteria at the Hungry Horse Project is a potential alternative to constructing a reregulating dam for flow control purposes. Modifications that could benefit the fishery include limiting flow fluctuations and lowering maximum flows during critical spawning periods and increasing minimum flows during egg incubation periods. Modification of operating criteria will be explored during the feasibility study.

OTHER FISH AND ENVIRONMENTAL QUALITY ELEMENTS

Removal of Car Bodies

Junked car bodies have been placed along sections of the Flathead River to help control bank erosion. Many of the car bodies no longer serve any function because of poor placement, movement by streamflows, changes in channel configuration, and silt buildup. The car bodies are now a navigational hazard and are esthetically unpleasing.

Removal of the car bodies and installation of rock riprap would eliminate the navigational hazard and improve erosion control, fish habitat, and visual quality. Economic and environmental justification for replacing the car bodies with rock riprap will be considered in the feasibility study.

Multilevel Outlet Works

The temperature of present water releases from Hungry Horse Dam remains near a constant 41° F throughout the year, and this unvarying regime may adversely affect fish productivity in the river. The potential for improving the temperature regime in the South Fork and main stem Flathead River by installation of a multilevel outlet works at Hungry Horse Dam is suggested in the Flathead River Basin Level B Study and was evaluated in the Bureau of Reclamation's 1980 preliminary study.

Preliminary studies show that a multilevel outlet could improve the temperature regime. The greatest improvement would occur if water were withdrawn from a layer within 50 feet of the surface of the reservoir. However, withdrawal from this layer could result in substantial losses to the reservoir fishery. Additional studies of the reservoir-stream fishery and other impacts must be made to determine the economic feasibility and environmental desirability of multilevel outlets.

RECREATION MEASURES

Overnight Camping Facilities at Hungry Horse Reservoir

Existing recreation facilities of the Flathead River basin appear adequate to satisfy overall demand. However, many privately owned facilities seem to be underused while Federal and State facilities are generally overused.

The National Park Service has indicated that no additional overnight facilities are planned for Glacier National Park even though visitor use and demand is expected to increase. Recreation development along Hungry Horse Reservoir appears to be capable of meeting some of the increased demands projected for Glacier National Park. The need and the potential for adding recreation facilities at Lid Creek and other sites around the reservoir will be evaluated in the feasibility study.

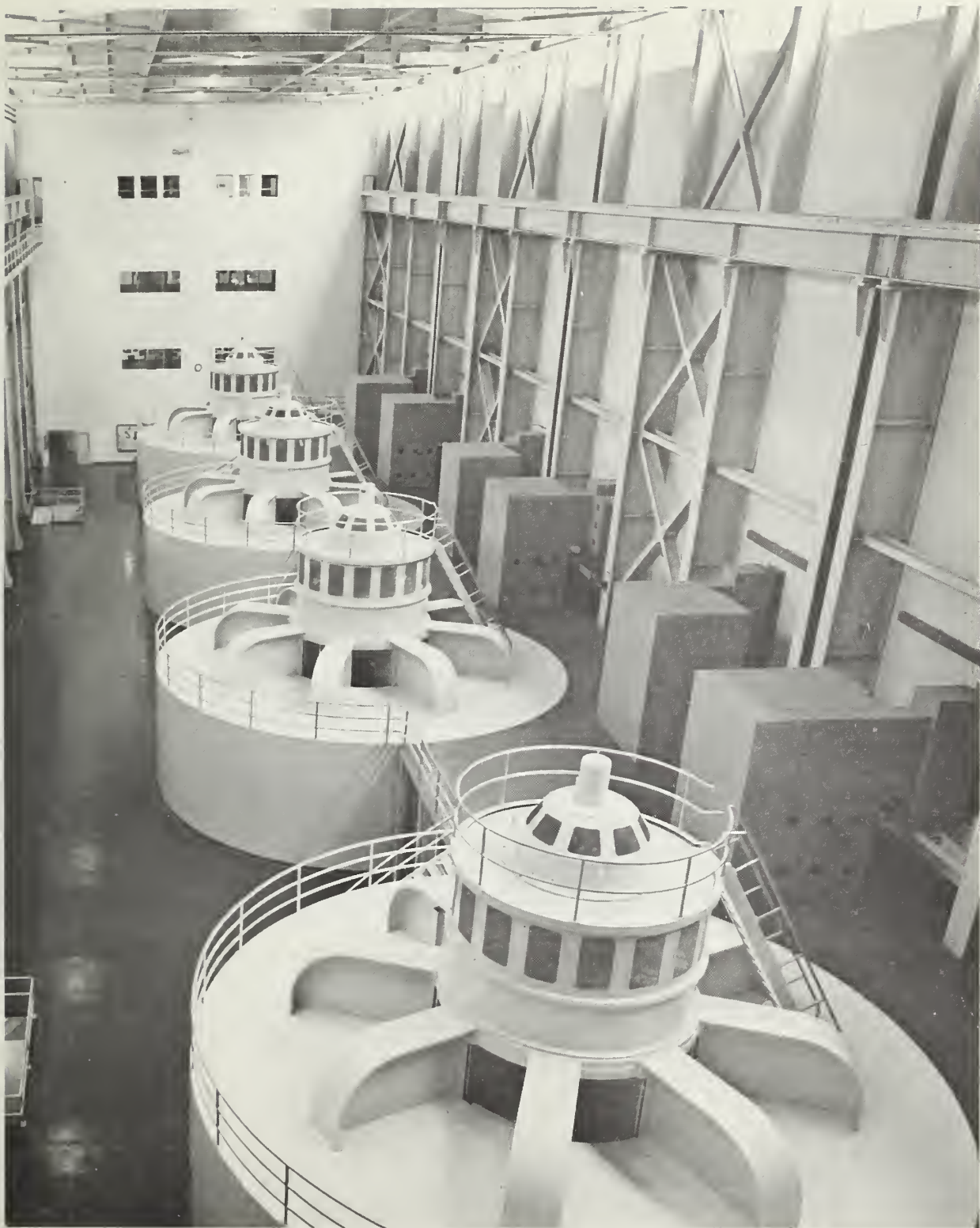
Hungry Horse Visitor Facilities

Existing visitor facilities at Hungry Horse Project are becoming outdated. The study will evaluate the feasibility and justification for modernizing the existing visitor facilities and providing additional interpretive facilities at the powerplant and other locations.

P U B L I C P A R T I C I P A T I O N

The Bureau of Reclamation will hold meetings in the local area during 1982 to provide information on the potentials and to solicit information from public interests in regard to significant environmental issues and plan elements that should be addressed in the study. Subsequent public meetings will be held as the need arises to review study results. At the end of the study a report which discusses project feasibility and environmental effects will be provided to the public for comment. If review results are favorable, a final report recommending a plan of development will be sent to the President and Congress for their consideration for construction authorization and funding.

A comment sheet is provided at the end of the brochure for your use to comment on any aspect of the study. Your comments will be carefully considered in evaluating potentials and formulating plans.



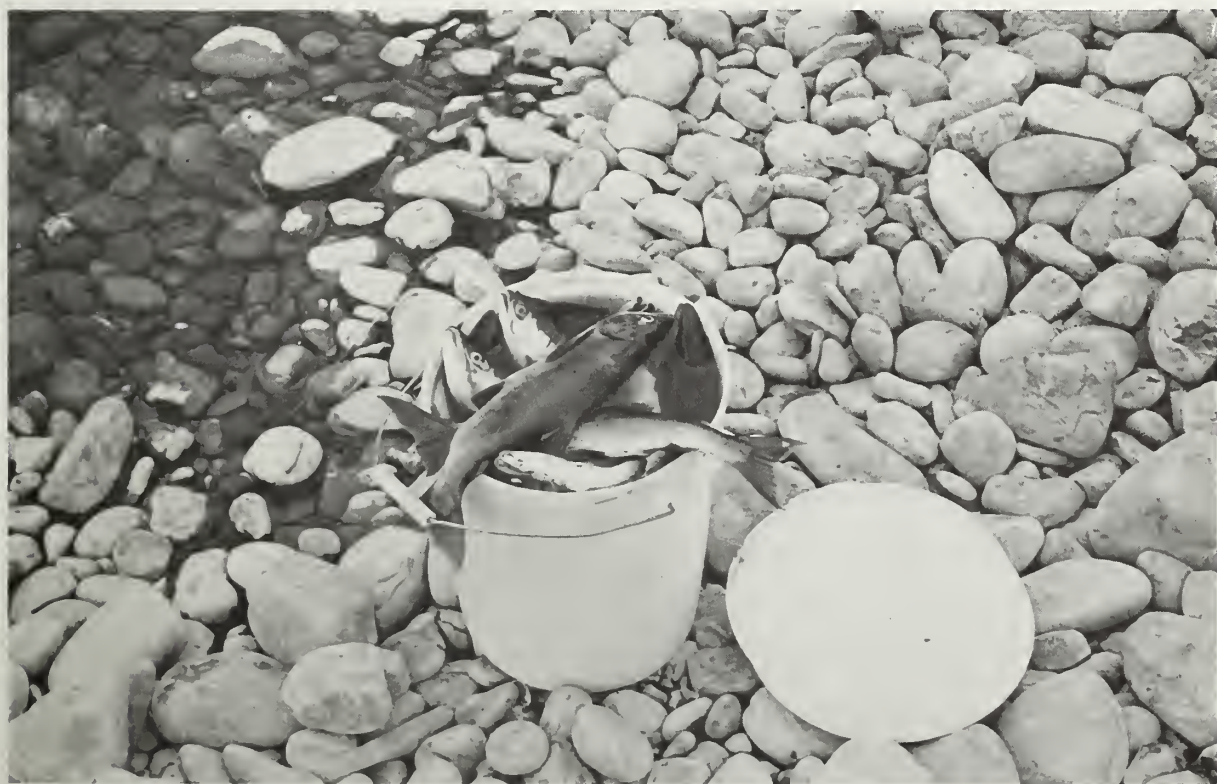
Hungry Horse Powerplant contains four equal-sized generators having a total nameplate rating of 285,000 kilowatts. (P447-100-207)



The valve house, located just downstream from Hungry Horse Dam, is a concrete structure that contains the outlet works control mechanisms. The valve house could be modified and converted to a new 55,000-kilowatt powerplant containing three generators. (P447-100-265)



Anglers snagging kokanee salmon in Middle Fork Flathead River below McDonald Creek confluence. (P447-100-272-I)



A good catch of kokanee salmon during snagging season. These fish average about 14 inches in length. (P447-100-273-I)

We welcome your comments on the Hungry Horse Powerplant Enlargement & Reregulating Reservoir Study, Montana

Lined area for writing comments.

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